

rain began at 10:35 p. m.; about 10:50 p. m. the two storms seemed to meet over the sea to the north-northwest of the city, and from that time until after 11 p. m. the discharges of lightning to the northwest were very vivid and numerous, but the thunder was not as loud as it had been during the previous ten or fifteen minutes; heavy rain began at 10:57 p. m.; the wind, which had been light and generally east during the evening until 10:45 p. m., reached a maximum of 32 miles from the northeast between 10:55 p. m. and 11 p. m.

Most of the studies of lightning hitherto published have emanated from northerly regions. We are glad to publish this article from within the Tropics, where lightning is supposed to be most intense, and where special opportunities offer for studying its spectrum, its structure, and its physical peculiarities.—C. A.

E. O. NATHURST.

Biographical note by H. C. BATE, Local Forecaster and Section Director.

Mr. Einer Oswald Nathurst, Voluntary Observer, Tennessee section of the Climate and Crop Service of the Weather Bureau, died at his home in Tracy City, Tenn., Thursday, October 15, 1903, aged 69 years.

Mr. Nathurst was a native of Stockholm, Sweden, and came to America in 1854. For many years he was bookkeeper in Nashville, Tenn. In 1865 he went to Tracy City, and entered the service of the Tennessee Coal, Iron, and Railroad Company, and from that time until his last illness was connected with that company.

For the past seven years he had been a faithful and valued member of the corps of voluntary observers of the Tennessee section of the Climate and Crop Service. His work was characterized by a remarkable record of promptness and accuracy.

He was a man of very considerable scientific attainment in many branches, particularly in geology and mineralogy, which made him especially valuable, both as superintendent of the great coal mining industries at Tracy City, and also as a voluntary observer in the Weather Bureau, and the Service sustains a great loss in his passing away.

RECENT PAPERS BEARING ON METEOROLOGY.

Dr. W. F. R. PHILLIPS, Librarian, etc.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a —.

Science. New York. N. S. Vol. 18.

Lockyer, J. Norman. Simultaneous Solar and Terrestrial Changes. Pp. 611-623.

Scientific American Supplement. New York. Vol. 61.

McLennan, J. O. Some Experiments on the Electrical Conductivity of Atmospheric Air. Pp. 23280-23281.

Nature. London. Vol. 68.

Strutt, R. J. Radium and the Sun's Heat. P. 572.

Everett, J. D. Rocket Lightning. P. 599.

MacDowall, Alex. B. Our Winters in Relation to Brückner's Cycle. P. 600.

Rotch, A. Lawrence. The New Bishop's Ring. P. 623.

Nature. London. Vol. 69.

Shaw, W. N. [Review of] Handbook of Climatology. Part 1. General Climatology. By Julius Hann. Translated by Robert de Courcy Ward. Pp. 3-4.

Langley, S. P. Variation of Atmospheric Absorption. P. 5.

Fowler, A.; Chree, Charles. Solar and Magnetic Disturbances. P. 6.

Shaw, W. N.; Ormond, R. T. Dr. Shaw's Address at the British Association. Pp. 6-7.

Mill, Hugh Robert. Weather Changes and the Appearance of Scum on Ponds. P. 7.

64—4

Lockyer, William J. S. Magnetic Storms, Auroræ and Solar Phenomena. Pp. 9-10.

Symons's Meteorological Magazine. London. Vol. 38.

Shaw, W. N. Methods of Meteorological Investigations. Pp. 151-159.

Druce, Francis. Sun Pillar. P. 159.

Ellis, William. Mean Rainfall. P. 162.

Popular Science Monthly. New York. Vol. 44.

Bell, Alexander Graham. The Aurora Borealis of August 21. Pp. 87-88.

Physical Review. Lancaster. Vol. 17. Pp. 233-244.

Proceedings of the Royal Society. London. Vol. 72.

Mattæi, Gabrielle L. C. On the Effect of Temperature on Carbon-Dioxide Assimilation. Pp. 355-356.

Astrophysical Journal. Chicago. Vol. 13.

Cortie, A. L. Solar Prominences and Terrestrial Magnetism. Pp. 287-293.

Philosophical Transactions of the Royal Society of London. London. Series A. Vol. 202.

Shaw, W. N. and Dines, W. H. Meteorological Observations obtained by the use of Kites off the west coast of Scotland. Pp. 123-141.

Knowledge. London. Vol. 26.

Damania, P. J. Radium and the Sun's Heat. P. 255.

Journal of the Franklin Institute. Philadelphia. Vol. 156.

Hammer, D. Airy's Theory of the Rainbow. Pp. 335-349.

Engineering News. New York. Vol. 50.

— Flood Damage to Bridges at Paterson, N. J. Pp. 377-378.

Aeronautical Journal. London. Vol. 7.

Hugo, T. H. The Sailing Flight of the Turkey Buzzard. Pp. 72-74.

Ciel et Terre. Bruxelles. 2^{me} année.

L., V. D. Les théories modernes sur la matière. Pp. 341-347.

— L'émanation radio-active de l'air atmosphérique. [Note on memoir by Elster and Geitel.] Pp. 389-390.

Debrowski, A. Quelques idées sur la forme et sur la structure des cristaux de neige. Pp. 391-403.

Comptes Rendus de l'Académie des Sciences. Paris. Tome 137.

Moissan, Henri. Sur le dosage de l'argon dans l'air atmosphérique. Pp. 600-606.

Annales de Chimie et de Physique. Paris. 7^{me} série. Tome 30.

Curie, Sklodowska (Mme.) Recherches sur les substances radio-actives. Pp. 145-203.

Bulletin de la Société Belge d'Astronomie. Bruxelles. 7^{me} année.

Vincent, J. La météorologie jugée par un astronome. Pp. 273-278.

Annuaire de la Société Météorologique de France. Paris. 51^{me} année.

Barbé, G. Sur la question des saintes de glace des 11-13 mai. Pp. 137-142.

Gaea. Leipzig. 39 Jahrgang.

— Studien über Gestalt und Struktur des Blitzes auf Grund photographischer Aufnahmen. Pp. 705-712.

— Eine seltsame Wirkung des Blitzes. Pp. 759-760.

Zeitschrift für Gewässerkunde. Leipzig. 6 Band.

Oppokow, E. Zur Frage der vieljährigen Abflussschwankungen in den Bassins grosser Flüsse, im Zusammenhang mit dem Gang der meteorologischen Elemente. Pp. 1-23.

Halbfass, Wilhelm. Stehende Seespiegelschwankungen (Seiches) im Müritzer in Pommern. Pp. 65-100.

Hempel, R. Die Hochwassergefahren und ihre Bekämpfung. Pp. 101-108.

Petermanns Mitteilungen. Gotha. Band 49.

Fitzner, Rud. Die Regenverteilung in der Kilikischen Ebene (Kleinasien.) Pp. 212-215.

Illustrierte Aeronautische Mitteilungen. Strassburg. 7 Jahrgang.

— Internationale Kommission für wissenschaftliche Luftschiffahrt. Pp. 358-359.

Geographische Zeitschrift. Leipzig. 9 Jahrgang.

Krug-Genthe, Martha. Der Chinook. Pp. 575-578.

Annalen der Hydrographie und Maritimen Meteorologie. Berlin. 31 Jahrgang.

— Die Staubbälle vom 19. bis 23. Februar 1903 über dem Nordatlantischen Ozean, Grossbritannien und Mitteleuropa. Pp. 425-438.

— Der westindischen Orkan vom 8. bis zum 15. August 1903. Pp. 439-441.

Krebs, Wilhelm. Staubbällebeobachtung im Oberelsass am 22. Februar 1903. Pp. 462-463.

Das Wetter. Berlin. 20 Jahrgang.

Treitschke, Fr. Die aktinometrische Differenz von Erfurt und Bericht über Versuche zur Aufzeichnung des Wärmeeffekts der diffusen Strahlen in der Atmosphäre. Pp. 217-225.

Ziegler, Alfred. Untersuchung der "Nachtfrostprognose nach Kammermann" für mehrere meteorologische Stationen Nord- und Mittel-deutschlands. Pp. 226-233.

Meteorologische Zeitschrift. Wien. Band 20.

Hann, J. Ueber die tägliche Drehung der mittleren Windrichtung auf Berggipfeln von 2-4km. Seehöhe. Pp. 433-444.

- Sassenfeld, Max. Die Bewölkung der Schneekoppe. Pp. 444-451.
 Woelkoff, A. Referate über russische Forschungen auf dem Gebiete der Meteorologie. Pp. 451-458.
 — Dr. Friedrich Draenert. P. 458.
 Hann, J. Dr. Fines: über den Regenfall zu Perpignan 1851-1900. Pp. 458-460.
 H[ann], J[ulius]. E. Imhof: über die Waldgrenze in der Schweiz. Pp. 461-462.
 Fényi, J. Ueber Konstruktion und Funktion eines einfachen Gewitterregistrators. Pp. 462-465.
 Hann, J. Resultate der meteorologischen Beobachtungen auf dem Blue Hill und Umgebung. Pp. 465-466.
 Hann, J. J. Jegerlehner: über die Schneegrenze in der Schweiz. Pp. 467-468.
 Hann, J. Zum Klima der italienischen Kolonie Erythräa. Pp. 468-469.
 — Resultate der Regenmessungen in Deutsch-Neu-Guinea in den

- Jahren 1900 und 1901. Pp. 469-471.
 Hann, J. O. Olufsen über das Klima der Pamir-Steppen. Pp. 472-474.
 Kumm, K. W. Meteorologische Beobachtungen aus dem Kamerun und Niger-Gebiet. Pp. 474-476.
 Hegyfok, J. Gewitterregen in Ungarn. Pp. 476-478.
 Hemel en Dampkring. Amsterdam. November 1903.
 Kater, J. Een regenboog. P. 348.
 Nell, Chr. A. C. Een mistboog. Pp. 349-350.
 Memorias de la Real Academia de Ciencias y Artes de Barcelona. Tercera epoca. Vol. 4.
 Puig y Valls, Rafael. Problema de meteorologia pirenaica. Pp. 483-489.
 Boletín Agrícola. Arequipa. Tomo 2.
 M., M. V. Revista meteorologica. El año meteorológico 1901-1902. Pp. 77-82.

NOTES AND EXTRACTS.

SUN SPOTS AND THE WEATHER CONDITIONS ON THE EARTH.

In a recent interview Professor Bigelow said:

The connection between the outbreak of sun spots and the weather conditions on the earth has been discussed for many years with very different conclusions. A certain class of students contends that there is a distinct connection between the weather conditions and the number of sun spots from year to year, while others maintain that such connection is really insignificant.

The fact is that the direct comparison of the weather with the sun spots does not do justice to the scientific side of the problem, because the sun exhibits an outflow of energy in other ways than by the number of visible sun spots. Such other ways are the prominences or hydrogen flames, the number of faculae, the extent of the corona, and the variation of the earth's magnetic field, as shown in the aurora and in the movements of the magnetic needles in the different parts of the earth.

The sun spots are a comparatively sluggish or insufficient register of the effect of the sun's internal action, especially as compared with the prominences or the magnetic field. Oftentimes there are sun spots without corresponding weather phenomena, or there may be active weather conditions without spots, but taking the statistics broadly from year to year it has been proved conclusively that the variation of the activity of the sun, as shown in its prominences or in the earth's magnetic field, does have a corresponding change in the variation of the annual temperatures and pressures in all parts of the earth.

The problem becomes very complicated for the meteorologist because the change in the sun's action first stirs up the circulation of the whole atmosphere of the earth, and this in its turn produces storms more or less vigorous in different parts of the earth; so that the occurrence of a storm at any given place must be referred back to the sun's action more or less indirectly through a long chain of circumstances. These are at present only partially understood, but rapid progress is being made in the examination and classification of the facts. We are looking now to a study of prominences and the magnetic field as promising more direct and valuable information regarding weather conditions than the sun spots. It is like trying to find the most sensitive pulse in a circulating system.

WEATHER BUREAU MEN AS INSTRUCTORS.

According to the News, Macon, Ga., October 22—

There are not less than thirty schools in and around Macon which are using the weather reports as charts for instruction. The teachers say that there is nothing which is so helpful in teaching physical geography as the information and the maps that are furnished by the Bureau. Ample opportunity is given the little ones to study the movement of the clouds, the variations in temperature, and the changing and shifting of the elements in a way that impresses the young mind and affords a practical illustration in fact to the truths that have been taught in theory.

Frequently classes from the city school system pay Mr. Weeks a visit for the purpose of examining more closely into his methods and instruments used in making his forecasts.

Mr. Edward A. Beals, District Forecaster, Portland, Oreg., reports that the second section of the high school class in physical geography visited the local office of the Weather Bureau on October 19 and was instructed by Assistant Observer John Grover.

It is announced that on December 18, Mr. Weston M. Fulton, Local Forecaster, Knoxville, Tenn., will deliver a public lecture on meteorological subjects at Chattanooga. At the close of the lecture a collection will be taken up to raise funds for the meteorological department of the high school.

As many high schools and other institutions in the country have been disappointed on finding that the Weather Bureau has no authority to loan or give apparatus for educational purposes, we commend to them this new method of raising funds needed to purchase the meteorological equipment.

Mr. Charles Stewart, Observer of the Weather Bureau, reports a lecture delivered by himself before the Spokane Science Club November 10. This was one of numerous lectures under the general title of "Weather Changes and their Causes," that he has delivered to various audiences; sometimes to the pupils of a primary grade school, sometimes to the advance pupils of a high school, and at other times to the general public.

In the present case Mr. Stewart reports that he began with some remarks on the composition of the atmosphere; then a Weather Bureau barometer was exhibited and the principle underlying the action of the barometer was considered. The prevailing upper westerly winds were cited as the cause of the easterly drift of the weather changes in our latitudes; a chart of an ideal cyclone was exhibited and the characteristics of pressure, winds, temperature, cloud and rain area, etc., within a cyclone noted; then the characteristics of the cyclone were considered in detail, involving some consideration of the cyclone as of convectional origin, and some of the properties of a gas when expanding or being compressed; the theory of cyclones was demonstrated by blackboard diagrams, together with diagrams relating to tornadoes. After the foregoing preliminaries, a large map of the United States was exhibited, and on this map the climatological divisions of the United States were noted and the average routes of cyclones traced. Then the course of an imaginary cyclone was traced from the Pacific to the Atlantic, and the resulting weather changes, as modified by topography, were pointed out; this involved a notice of warm waves, chinooks, cold waves, and tornadoes. The cause of the limitation of tornadoes to the eastern portion of the country was also considered and forecasting was touched upon.

Mr. L. M. Pindell, Observer Weather Bureau, Chattanooga, Tenn., reports an afternoon devoted to the local high school class in meteorology on October 9.

Prof. Alexander G. McAdie reports that on October 19, forty pupils of the Adams Cosmopolitan School of San Francisco visited the Weather Bureau office of that city and spent about one hour, receiving the usual instruction and explanations relative to Weather Bureau work.